- **Rule 8010—Fugitive Dust Administrative Requirements for Control of PM_{10}:** Sets forth definitions, applicability and administrative requirements for anthropogenic sources of PM_{10}.
- **Rule 8020—Fugitive Dust Requirements for Control of PM_{10} from Construction, Demolition, Excavation and Extraction Activities:** Limits fugitive dust emissions from construction, demolition, excavation, and related activities.

All applicable LORS are summarized in Table 8.1-15.

8.1.5 Environmental Consequences

8.1.5.1 Overview of the Analytical Approach to Estimating Facility Impacts

The emissions sources at MEGS include two gas turbines, a spray dryer for the zero liquid discharge (ZLD) system, and two cooling towers. The actual operation of the turbines will range between 20 percent and 100 percent of their maximum rated output. Inlet air cooling will be used to maintain power output under warm ambient conditions. Emission control systems will be fully operational during all operations except startups and shutdowns. Maximum annual emissions are based on operation of the Project at maximum firing rates and include the expected maximum number of startup periods that may occur in a year. Each turbine startup will result in transient emission rates until steady-state operation for the gas turbine and emission control systems is achieved.

Ambient air quality impact analyses for the site have been conducted to satisfy SJVUAPCD and CEC requirements for criteria pollutants (NO_2, CO, PM_{10}, and SO_2), noncriteria pollutants, and construction impacts on a pollutant-specific basis. The following sections describe the emission sources that have been evaluated, the ambient impact analyses results, and the evaluation of facility compliance with the applicable air quality regulations, including SJVUAPCD Rules 2010 and 2201.

8.1.5.1.1 Facility Emissions

The proposed Project will be the construction of a peaking power plant. The new equipment will consist of two General Electric LM6000 gas turbines, each rated at 47.5 MW (nominal at average site design conditions), an electrically heated spray dryer with baghouse, and two 2-cell pre-fabricated, pre-engineered cooling towers used for the inlet air coolers. Natural gas will be the only fuel consumed during plant operation. There will be no distillate fuel oil firing at MEGS. Typical specifications for the natural gas fuel are shown in Table 8.1-16.

Natural gas combustion results in the formation of NO_x, SO_2, unburned hydrocarbons (VOC), PM_{10}, and CO. Because natural gas is a clean burning fuel, there will be minimal formation of combustion PM_{10} and SO_2. The gas turbines will be equipped with water injection that minimizes the formation of NO_x. To further reduce NO_x and CO emissions, selective catalytic reduction (SCR) and oxidation catalyst control systems will be utilized.

Various other pollutants will also be emitted by the facility, including ammonia (NH_3), which is used as a reactant by the SCR systems to control NO_x. Emissions of all of the criteria and noncriteria pollutants have been characterized and quantified in this application.

TABLE 8.1-15
LORS and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Sections)
Federal					
Clean Air Act (CAA) §160-169A and implementing regulations, Title 42 United States Code (USC) §7470-7491 (42 USC §7470-7491), Title 40 Code of Federal Regulations (CFR) Parts 51 & 52 (Prevention of Significant Deterioration Program)	Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies to pollutants for which ambient concentrations are lower than NAAQS.	USEPA	Issues Prevention of Significant Deterioration Permit for a Major Modification to an Existing Major Source.	PSD is not triggered for the MEGS Project.	8.1.6
CAA §171-193, 42 USC §7501 et seq. (New Source Review)	Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than NAAQS.	SJVUAPCD with USEPA oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6
CAA §401 (Title IV), 42 USC §7651 (Acid Rain Program)	Requires monitoring of NO_x and SO_2 emissions and purchase of SO_2 allowances.	SJVUAPCD with USEPA oversight	Issues Acid Rain monitoring plan error report after review of application.	Meet compliance deadlines listed in regulations; permit issued in conjunction with Title V permit.	8.1.6
CAA §501 (Title V), 42 USC §7661 (Federal Operating Permits Program)	Establishes comprehensive permit program for major stationary sources.	SJVUAPCD with USEPA oversight	Issues Title V permit after review of application.	Application to be made within 12 months of start of facility operation.	8.1.6
CAA §111, 42 USC §7411, 40 CFR Part 60 (New Source Performance Standards—NSPS)	Establishes national standards of performance for new stationary sources.	SJVUAPCD with USEPA oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6

TABLE 8.1-15
LORS and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Sections)
State					
H&SC §44300-44384; California Code of Regulations (CCR) §93300-93347 (Toxic "Hot Spots" Act)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments.	SJVUAPCD with CARB oversight	After Project review, issues DOC with conditions limiting emissions.	Screening HRA submitted as part of SPPE application.	8.1.6
California Public Resources Code §25523(a); 20 CCR §§1752, 2300-2309 (CEC & CARB Memorandum of Understanding)	Requires that CEC's decision on AFC include requirements to assure protection of environmental quality; AFC required to address air quality protection.	CEC	After Project review, issues Final Certification with conditions limiting emissions.	SJVUAPCD approval of SPPE, i.e., DOC, to be obtained prior to CEC approval.	8.1.6
Local					
SJVUPCD Rule 2201 (New and Modified Stationary Source Review)	NSR: Requires that preconstruction review be conducted for all proposed new or modified sources of air pollution, including BACT, emissions offsets, and air quality impact analysis.	SJVUAPCD with CARB oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6
SJVUAPCD Rule 2520 (Federally Mandated Operating Permits)	Implements operating permits requirements of CAA Title V.	SJVUAPCD with USEPA oversight	Issues Title V permit after review of application.	Application to be submitted within 12 months of start of facility operation.	8.1.6
SJVUAPCD Rule 2540 (Acid Rain Program)	Implements acid rain regulations of CAA Title IV.	SJVUAPCD with USEPA oversight	Issues Title IV permit after review of application.	Permit issued in conjunction with Title V permit.	8.1.6
SJVUAPCD Rule 4101 (Visible Emissions)	Limits visible emissions to no darker than Ringelmann No. 2 for periods greater than 3 minutes in any hour.	SJVUAPCD with CARB oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained prior to commencement of operation.	8.1.6
SJVUAPCD Rule 4102 (Public Nuisance)	Prohibits emissions in quantities that adversely affect public health, other businesses, or property.	SJVUAPCD with CARB oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6

TABLE 8.1-15
LORS and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Sections)
SJVUAPCD Rule 4201 (Particulate Matter)	Limits PM emissions from stationary sources.	SJVUAPCD with CARB oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6
SJVUAPCD Rule 4801 (Sulfur Compounds Emissions)	Limits SO_2 emissions from stationary sources.	SJVUAPCD with CARB oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6
SJVUAPCD Rule 4703 (Stationary Gas Turbines)	Limits NO_x and CO emissions from gas turbines.	SJVUAPCD with CARB oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6
SJVUAPCD Rule 4001 (New Source Performance Standards: 40 CFR 60, Subpart GG, Stationary Gas Turbines)	Requires monitoring of fuel, other operating parameters; limits NO_x and SO_2 and PM emissions, requires source testing, emissions monitoring, and recordkeeping.	SJVUAPCD with CARB oversight	After Project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6

TABLE 8.1-16
Nominal Fuel Properties—Natural Gas

Component Analysis		Chemical Analysis	
Component	**Average Concentration, Volume**	**Constituent**	**Percent by Weight**
CH_4	96.15%	C	73.09%
C_2H_6	1.96%	H	24.13%
C_3H_8	0.21%	N	2.05%
C_4H_{10}	0.06%	O	0.73%
C_5H_{12}	0.01%	S	0.36 gr/100 scf
C_6H_{14}	0.01%		
N_2	1.22%		
CO_2	0.38%	Higher Heating Value	1,018 Btu/scf 23,074 Btu/lb
S	<0.001%		

Criteria Pollutant Emissions

The gas turbine emission rates have been estimated from vendor data, Project design criteria, and established emission calculation procedures. The emission rates for the gas turbines are shown in Table 8.1-17.

TABLE 8.1-17
Maximum Pollutant Emission Rates, Each Gas Turbine[a]

Pollutant	ppmvd @ 15% O_2	lb/MMBtu—HHV Basis	lb/hr
NO_x	2.5	0.0091	4.5
CO	6.0	0.0132	6.6
VOC	2.0	0.0025	1.3
PM_{10}[b]	-	0.0060	3.0
SO_2[c]	0.20	0.0010	0.5

[a] Emission rates shown reflect the highest value at any operating load. For NO_x, CO, and VOC, values exclude startups and shutdowns.
[b] 100 percent of particulate matter emissions assumed to be emitted as PM_{10}; PM_{10} emissions include both front and back half as those terms are used in USEPA Method 5.
[c] Based on fuel sulfur content of 0.36 grains/100 scf. See Appendix 8.1B for detailed fuel sulfur content data.

The maximum firing rates, daily and annual fuel consumption rates, and operating restrictions define the allowable operations that determine the maximum potential hourly, daily, and annual emissions for each pollutant. These allowable operations are typically referred to as "the operating envelope" for a facility. The maximum heat input rates (fuel consumption rates) for the gas turbines are shown in Table 8.1-18.

TABLE 8.1-18
Maximum Facility Fuel Use (MMBTU—HHV Basis)

Period	Gas Turbines (each[a])	Total Fuel Use (both units)
Per hour	500	1,000
Per day	12,000[b]	24,000
Per year	4,380,000[c]	8,760,000

[a] Each of two turbines.
[b] Based on 24 hours per day at maximum firing rate.
[c] Based on 8,760 hours per year at maximum firing rate.

Maximum emission rates expected to occur during a startup or shutdown are shown in Table 8.1-19. CO, VOC, PM_{10}, and SO_2 emissions have not been included in this table because emissions of these pollutants will not be higher during a startup than during base load facility operation.

TABLE 8.1-19
Facility Startup/Shutdown Emission Rates[a]

	NO_x
Startup/Shutdown, lb/hour	20
Startup/Shutdown, lb/start[b]	20

[a] Estimated based on vendor data. See Appendix 8.1B.
[b] Maximum emissions based on 1-hour startup.

The analysis of maximum facility emissions was based on the turbine emission factors shown in Table 8.1-17, the startup emission rates shown in Table 8.1-19, and the ambient conditions that result in the highest emission rates. Cooling tower emissions were based on the dissolved solids content, circulation rate, and drift loss values in Appendix 8.1B. Spray dryer emissions were calculated based on vendor data for baghouse inlet loading and baghouse control efficiency presented in Appendix 8.1B. The maximum annual, daily, and hourly emissions for the Project are shown in Table 8.1-20 and are based on the following operating cases:

Maximum Hourly Emissions:

For NO_x:

- Two turbines are in startup mode

For CO, VOC, SO_2 and PM_{10}:

- Two turbines operating at full load
- Cooling towers and spray dryer operate at maximum output

Maximum Daily Emissions:

For NO_x:

- Each turbine operates in startup mode for 3 hours (three separate startups)
- Each turbine operates at full load for 21 hours

For CO, VOC, SO_2 and PM_{10}:

- Each turbine operates at full load for 24 hours
- Cooling towers and spray dryer operate at maximum output for 24 hours

Maximum Annual Emissions:

For NO_x:

- Each turbine operates in startup or shutdown mode for 365 hours per year
- Each turbine operates at full load for 8,395 hours per year

For CO, VOC, SO_2 and PM_{10}:

- Each turbine operates at full load for 8,760 hours per year
- Cooling tower and spray dryer operates at maximum output for 8,760 hours per year

Detailed emission calculations appear in Appendix 8.1B. Emissions from the cooling towers were calculated from the maximum cooling water TDS level.

TABLE 8.1-20
Emissions From New Equipment[a]

	NO_x	SO_2	CO	VOC	PM_{10}
Maximum Hourly Emissions, lb/hr					
Turbines	40.0	1.0	13.2	2.5	6.0
Cooling Towers	-	-	-	-	0.06~~1~~
Spray Dryer	-	-	-	-	0.05
Total Project, pounds per hour	40.0	1.0	13.2	2.5	6.1
Maximum Daily Emissions, lb/day					
Turbines	310.2	24.3	317.7	60.6	144.0
Cooling Towers	-	-	-	-	1.2
Spray Dryer	-	-	-	-	1.2
Total Project, pounds per day	310.2	24.3	317.7	60.6	~~145.2~~146.4
Maximum Annual Emissions, tpy					
Turbines	45.3	4.4	58.0	11.1	26.3
Cooling Towers	-	-	-	-	0.2
Spray Dryer	-	-	-	-	0.2
Total Project, tons per year	45.3	4.4	58.0	11.1	26.7~~5~~

[a] See Appendix 8.1B for detailed calculations.

Noncriteria Pollutant Emissions

Noncriteria pollutants are compounds that have been identified as pollutants that pose a significant health hazard. Nine of these pollutants are regulated under the federal New Source Review program: lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds.[1] In addition to these nine compounds, the federal Clean Air Act lists 189 substances as potential hazardous air pollutants (Clean Air Act Sec. 112(b)(1)). The SJVUAPCD has also published a list of compounds it defines as potential toxic air contaminants (Toxics Policy, May 1991; Rule 2-1-316). Any pollutant that may be emitted from the Project and is on the federal New Source Review list, the federal Clean Air Act list, and/or the SJVUAPCD toxic air contaminant list has been evaluated as part of the SPPE. Emission factors were determined by reviewing the available technical data, determining the products of combustion, and/or using material balance calculations.

Noncriteria pollutant emission factors for the analysis of emissions from the gas turbines were obtained from AP-42 (Table 3.1-3, 4/00, and Table 3.4-1 of the Background Document for Section 3.1) and from the California Air Resources Board's CATEF database for gas turbines. Specifically, the factors for acetaldehyde, acrolein, benzene, ethyl benzene, and formaldehyde were taken from AP-42 for gas turbines. AP-42 did not contain factors for hexane, propylene, and did not include speciated data for PAHs. Factors for these pollutants as well as propylene oxide, toluene, and xylene were taken from the CATEF database (mean values) for gas turbines. Noncriteria pollutant emissions from the spray dryer and cooling towers were calculated from an analysis of cooling tower water supply.

The noncriteria pollutants that may be emitted from the Project are shown in Table 8.1-21. Appendix 8.1B provides the detailed emission calculations for noncriteria pollutants with the exception of ammonia, which is calculated from an ammonia slip level of 10 ppm. Although the turbines will be equipped with oxidation catalyst systems, no additional control efficiency associated with the oxidation catalyst system is used in the noncriteria pollutant emission calculations for this Project. As emissions of each individual HAP are below 10 tons per year and total HAP emissions are below 25 tons per year, the turbines are not subject to the MACT requirements of 40 CFR Part 63.

TABLE 8.1-21 (REVISED 6/13/03)
Noncriteria Pollutant Emissions

		Emissions	
Pollutant	**Emission Factor (lb/MMscf)**	**Lbs/hr (each)**	**Tons/yr (total, 2 ~~turbines~~units)**
Gas Turbines			
Ammonia	-a	6.71	58.8
Propylene	7.71×10^{-1}	0.38	3.3
HAPs			
Acetaldehyde	1.80×10^{-1}	0.09	0.8

[1] These pollutants are regulated under federal and state air quality programs; however, they are evaluated as non-criteria pollutants by the California Energy Commission.

TABLE 8.1-21 (REVISED 6/13/03)
Noncriteria Pollutant Emissions

Pollutant	Emission Factor (lb/MMscf)	Emissions Lbs/hr (each)	Tons/yr (total, 2 ~~turbines~~units)
Acrolein	3.69×10^{-3}	1.8×10^{-3}	<0.1
Benzene	3.33×10^{-3}	1.6×10^{-3}	<0.1
1,3-Butadiene	1.27×10^{-4}	6.2×10^{-5}	<0.1
Ethylbenzene	3.26×10^{-2}	0.02	0.1
Formaldehyde	3.67×10^{-1}	~~0.36~~0.18	1.6
Hexane	2.59×10^{-1}	0.13	1.1
~~Naphthalene~~	~~1.66×10^{-3}~~	~~8.2×10^{-4}~~	~~<0.1~~
Propylene Oxide	4.78×10^{-2}	0.02	0.2
Toluene	7.10×10^{-2}	0.04	0.3
Xylene	2.61×10^{-2}	0.01	0.1
Polycyclic Aromatics			
Benzo(a)anthracene	2.26E-005	1.1×10^{-5}	<0.1
Benzo(a)pyrene	1.39E-005	6.8×10^{-6}	<0.1
Benzo(b)fluoranthrene	1.13E-005	5.6×10^{-6}	<0.1
Benzo(k)fluoranthrene	1.10E-005	5.4×10^{-6}	<0.1
Chrysene	2.52E-005	1.2×10^{-5}	<0.1
Dibenz(a,h)anthracene	2.35E-005	1.2×10^{-5}	<0.1
Indeno(1,2,3-cd)pyrene	2.35E-005	1.2×10^{-5}	<0.1
Naphthalene	1.66×10^{-3}	8.2×10^{-4}	<0.1
~~Propylene Oxide~~	~~4.78×10^{-2}~~	~~0.02~~	~~0.2~~
~~Toluene~~	~~7.10×10^{-2}~~	~~0.04~~	~~0.3~~
~~Xylene~~	~~2.61×10^{-2}~~	~~0.01~~	~~0.1~~
Total (two turbines) =			66.3
Total (two turbines) less ammonia/propylene =			4.2

Pollutant	Emission Factor (mg/L)	Lbs/hr	Tons/yr
Spray Dryer			
Chloride	169	4.3×10^{-3}	<0.1
Sulfate	880	2.2×10^{-2}	<0.1
HAPs			
Arsenic	0.036	9.1×10^{-7}	<0.1
Chromium VI	0.020	5.0×10^{-7}	<0.1

TABLE 8.1-21 (REVISED 6/13/03)
Noncriteria Pollutant Emissions

Pollutant	Emission Factor (lb/MMscf)	Emissions	
		Lbs/hr (each)	Tons/yr (total, 2 ~~turbines~~units)
Vanadium	0.152	$3.8x10^{-6}$	<0.1
Spray Dryer Total =			0.1

Pollutant	Emission Factor (mg/L)	Lbs/hr (each)	Tons/yr (total, 2 ~~cooling towers~~units)
Cooling Towers			
~~Copper~~	~~0.081~~	~~1.3×10^{-6}~~	~~<0.1~~
Chloride	~~0.201~~104	~~3.2×10^{-6}~~1.7×10^{-3}	<0.1
Sulfate	112	1.8×10^{-3}	<0.1
~~Zinc~~	~~0.321~~	~~5.2×10^{-6}~~	~~<0.1~~
HAPs			
Arsenic	~~0.018~~0.036	5.8~~2.9~~$\times 10^{-7}$	<0.1
~~Cadmium~~	~~0.003~~	~~4.8×10^{-8}~~	~~<0.1~~
~~Chromium III~~	~~0.015~~	~~2.4×10^{-7}~~	~~<0.1~~
Chromium VI	~~0.0051~~0.020	3.2×10^{-7} ~~8.2×10^{-8}~~	<0.1
~~1,2 - Dichloroethene~~	~~0.013~~	~~2.1×10^{-7}~~	~~<0.1~~
~~Lead~~	~~0.012~~	~~1.9×10^{-7}~~	~~<0.1~~
~~Manganese~~	~~0.054~~	~~8.7×10^{-7}~~	~~<0.1~~
~~Nickel~~	~~0.015~~	~~2.4×10^{-7}~~	~~<0.1~~
~~Trichloroethene~~	~~0.0099~~	~~1.6×10^{-7}~~	~~<0.1~~
Vanadium	0.152	2.5×10^{-6}	<0.1
Cooling Towers Total =			<0.1

[a] Ammonia emissions calculated from 10 ppm ammonia slip rate. See Appendix 8.1B.

8.1.5.1.2 Air Quality Impact Analysis

Air Quality Modeling Methodology

An assessment of impacts from the Project on ambient air quality has been conducted using USEPA-approved air quality dispersion models. These models are based on various mathematical descriptions of atmospheric diffusion and dispersion processes in which a pollutant source impact can be calculated over a given area. The modeling analysis was performed pursuant to a modeling protocol submitted to the SJVUAPCD on December 30, 2002 (see Appendix 8.1C).

The impact analysis was used to determine the worst-case ground-level impacts of the proposed Project. The results were compared with established state and federal ambient air quality standards. If the standards are not exceeded under these worst-case conditions, then it is demonstrated that no exceedances are expected under any conditions. In accordance with the air quality impact analysis guidelines developed by USEPA (40 CFR Part 51, Appendix W: *Guideline on Air Quality Models*) and CARB (*Reference Document for California Statewide Modeling Guideline*, April 1989), the ground-level impact analysis includes the following assessments:

- Impacts in simple, intermediate, and complex terrain,
- Aerodynamic effects (downwash) as a result of nearby building(s) and structures, and

- Impacts from inversion breakup (fumigation).

Simple, intermediate, and complex terrain impacts were assessed for all meteorological conditions that would limit the amount of final plume rise. Plume impaction on elevated terrain, such as on the slope of a nearby hill, can cause high ground-level concentrations, especially under stable atmospheric conditions. Another dispersion condition that can cause high ground-level pollutant concentrations is caused by building downwash. Building downwash can occur when wind speeds are high and a building or structure is in close proximity to the emission stack. This can result in building wake effects where the plume is drawn down toward the ground by the lower pressure region that exists in the lee side (downwind) of the building or structure.

Fumigation conditions occur when the plume is emitted into a low-lying layer of stable air (inversion) that then becomes unstable, resulting in a rapid mixing of pollutants toward the ground. The low mixing height that results from this condition allows little diffusion of the stack plume before it is carried downwind to the ground. Although fumigation conditions rarely last as long as an hour, relatively high ground-level concentrations may be reached during that period. Fumigation tends to occur under clear skies and light winds, and is more prevalent in the summer.

The basic model equation used in this analysis assumes that the concentrations of emissions within a plume can be characterized by a Gaussian distribution about the centerline of the plume. Concentrations at any location downwind of a point source such as a stack can be determined from the following equation:

$$C(x,y,z,H) = \left(\frac{Q}{2\pi\sigma_y\sigma_z u}\right) * \left(e^{-1/2\left(y/\sigma_y\right)^2}\right) * \left[\left\{e^{-1/2(z-H/\sigma_z)^2}\right\} + \left\{e^{-1/2(z+H/\sigma_z)^2}\right\}\right]$$

where:

C	=	the concentration in the air of the substance or pollutant in question
Q	=	the pollutant emission rate
$\sigma_y \sigma_z$	=	the horizontal and vertical dispersion coefficients, respectively, at downwind distance x
u	=	the wind speed at the height of the plume center
x,y,z	=	the variables that define the 3-dimensional Cartesian coordinate system used; the downwind, crosswind, and vertical distances from the base of the stack
H	=	the height of the plume above the stack base (the sum of the height of the stack and the vertical distance that the plume rises due to the momentum and/or buoyancy of the plume)

Gaussian dispersion models are approved by USEPA for regulatory use and are based on conservative assumptions (i.e., the models tend to overpredict actual impacts by assuming steady-state conditions, no pollutant loss through conservation of mass, no chemical reactions, etc.). The USEPA models were used to determine if ambient air quality standards would be exceeded, and whether a more accurate and sophisticated modeling procedure would be warranted to make the impact determination. The following sections describe:

- Screening modeling procedures
- Refined air quality impact analysis
- Existing ambient pollutant concentrations and preconstruction monitoring
- Results of the ambient air quality modeling analyses

The screening and refined air quality impact analyses were performed using the Industrial Source Complex, Short-Term Model ISCST3 (Version 02035). ISCST3 is a Gaussian dispersion model capable of assessing impacts from a variety of source types in areas of simple, intermediate, and complex terrain. The model can account for settling and dry deposition of particulates; area, line, and volume source types; downwash effects; and gradual plume rise as a function of downwind distance. The model is capable of estimating concentrations for a wide range of averaging times (from one hour to one year).

Inputs required by the ISCST3 model include the following:

- Model options
- Meteorological data
- Source data
- Receptor data

Model options refer to user selections that account for conditions specific to the area being modeled or to the emissions source that needs to be examined. Examples of model options include use of site-specific vertical profiles of wind speed and temperature; consideration of stack and building wake effects; and time-dependent exponential decay of pollutants. The model supplies recommended default options for the user. Except where explicitly stated, such as for building downwash, as described in more detail below, default values were used. A number of these default values are required for USEPA and local district approval of model results and are listed below.

- Rural dispersion coefficients
- Gradual plume rise
- Stack tip downwash
- Buoyancy induced dispersion
- Calm processing
- Default rural wind profile exponents = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55
- Default vertical temperature gradients = 0.02, 0.035
- 10 meter anemometer height

ISCST3 uses hourly meteorological data to characterize plume dispersion. The representativeness of the data is dependent on the proximity of the meteorological monitoring site to the area under consideration, the complexity of the terrain, the exposure of the meteorological monitoring site, and the period of time during which the data are collected. The meteorological data used in this analysis were collected at the Modesto Airport, about 19 km southeast of the Project site.

This 1999 data set was approved by the SJVUAPCD staff as being representative of meteorological conditions at the Project site and as meeting the requirements of the

USEPA "On-Site Meteorological Program Guidance for Regulatory Model Applications" (EPA-450/4-87-013, August 1995).

Meteorological data for the Modesto Airport were obtained from the National Climatic Data Center. Morning and afternoon mixing heights utilized for these data were determined from interpolating quarterly mixing heights for the Project area from the quarterly isopleths given in guidance (Holzworth, 1972).

The locations of the facility and the monitoring station are shown in Appendix 8.1A, Figure 8.1-17. The area in the vicinity of the Project site and monitoring station is relatively flat.

The area surrounding the Project site can be characterized, for dispersion purposes, as rural. The area within three kilometers of the Project site includes mainly outlying orchards and farming areas, with some residential areas and industrial areas. In accordance with the Auer land use classification methodology (USEPA's *Guideline on Air Quality Models*), land use within the area circumscribed by a three km radius around the facility is greater than 50 percent rural. Therefore, in the modeling analyses supporting the permitting of the facility, rural dispersion coefficients have been assigned.

Representativeness has been defined in the *Workshop on the Representativeness of Meteorological Observations* (Nappo et al., 1982) as "the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application." Judgments of representativeness should be made only when sites are climatologically similar, as the Project site and the Modesto Airport station clearly are. Representativeness has also been defined in the PSD Monitoring Guideline as data that characterize the air quality for the general area in which the proposed Project would be constructed and operate. The large-scale topographic features that influence the Modesto Airport monitoring station also influence the proposed Project site in the same manner.

In determining the representativeness of the Modesto Airport station data set, relative to the Project site, the following considerations were addressed.

Aspect Ratio of Terrain

The aspect ratio of the terrain, which is the ratio of the height to the width of a hill at its base, near the Modesto Airport monitoring station is nearly identical to the terrain near the Project site. No large differences were discerned: the terrain is essentially flat at both locations.

Slope of Terrain

Terrain in the immediate vicinity east of the Project site and the Modesto monitoring station is relatively flat.

Ratio of Terrain Height to Stack/Plume Height

Terrain heights in the hills bordering the San Joaquin Valley, 24 km away at closest approach, range from 200 to 400 meters above stack base. Final plume height for a similar kind of project (stack height plus plume rise) was calculated for D stability and a wind speed of 5 meter/second (m/s) to be about 280 meters. Thus, it is conceivable, though unlikely due to the great distance involved, that some maximum Project impacts may occur in complex terrain. Nevertheless, the possibility of complex terrain concentration maxima will be first checked with SCREEN3 modeling, which employs conservative screening meteorology, prior to modeling with ISCST3.

Correlation of Terrain Features to Prevailing Meteorological Conditions

As discussed in detail earlier, the orientation and aspect of terrain in the Project area correlate well with the prevailing wind fields in the Modesto wind rose, with little apparent influence by local terrain perturbations (such as small hill outcroppings or canyon orientations). Wind flow at the Modesto monitoring station would therefore be nearly identical to the Project site.

The orientation and aspect of terrain in the Project area correlates well with the prevailing wind fields in the Modesto Airport windrose, with little apparent influence by local terrain perturbations (such as small hill outcroppings or canyon orientations). Wind flow at the Modesto Airport monitoring station is therefore essentially identical to the Project site. Thus, it is the Applicant's assessment that the wind direction and wind speed data collected at the Modesto Airport monitoring station are very similar to the dispersion conditions at the Project site and to the regional area. The Modesto 1999 windroses do not indicate any noticeable effects on the potential dispersion of pollutants from the Project site on a regional scale from other influences. Thus, the Modesto Airport data set satisfies the definition of representative data.

The required emission source data inputs to ISCST3 include source locations, source elevations, stack heights, stack diameters, stack exit temperatures and velocities, and emission rates. The source locations are specified for a Cartesian (x,y) coordinate system where x and y are distances east and north in meters, respectively. The Cartesian coordinate system used is the Universal Transverse Mercator Projection (UTM). The stack height that can be used in the model is limited by federal Good Engineering Practice (GEP) stack height restrictions, discussed in more detail below. In addition, ISCST3 requires nearby building dimension data to calculate the impacts of building downwash.

For the purposes of modeling, a stack height beyond what is required by Good Engineering Practices is not allowed (SJVUAPCD Regulation 2-2-418). However, this requirement does not place a limit on the actual constructed height of a stack. GEP as used in modeling analyses is the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles. In addition, the GEP modeling restriction assures that any required regulatory control measure is not compromised by the effect of that portion of the stack that exceeds the GEP. The USEPA guidance ("Guideline for Determination of Good Engineering Practice Stack Height," revised 6/85) for determining GEP stack height is as follows:

$$H_g = H + 1.5L$$

where

H_g = Good Engineering Practice stack height, measured from the ground-level elevation at the base of the stack

H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack

L = lesser dimension, height or maximum projected width, of nearby structure(s)

In using this equation, the guidance document indicates that both the height and width of the structure are determined from the frontal area of the structure, projected onto a plane perpendicular to the direction of the wind.

For the turbine stacks, the nearby (influencing) structures are the gas turbine enclosures, which are 20 feet (6.09 m) high and 57 feet (17.38 m) long. Thus, H = 20 ft and L = 57 feet, and H_g = 20 ft + (1.5 * 57 ft) = 106 ft, and the proposed stack height of 85 feet does not exceed GEP stack height.

For regulatory applications, a building is considered sufficiently close to a stack to cause wake effects when the downwind distance between the stack and the nearest part of the building is less than or equal to five times the lesser of the height or the projected width of the building. Building dimensions for the buildings analyzed as downwash structures were obtained from digital plot plans. The building dimensions were analyzed using the Building Profile Input Program (BPIP) to calculate 36 wind-direction-specific building heights and projected building widths for use in building wake calculations. The building dimensions used in the GEP analysis are shown in Appendix 8.1D, Table 8.1D-1.

Screening Procedures

To ensure the impacts analyzed were for maximum emission levels and worst-case dispersion conditions, a screening procedure was used to determine the inputs to the impact modeling. The screening procedure analyzed the turbine operating conditions that would result in the maximum impacts on a pollutant-specific basis. The operating conditions examined in this screening analysis, along with their exhaust and emission characteristics, are shown in Appendix 8.1D, Table 8.1D-2. These operating conditions represent maximum and minimum turbine loads (100 percent and 20 percent) at maximum, average, and minimum ambient operating temperatures (102°F, 67°F, and 15°F, respectively).

The operating conditions were screened for worst-case ambient impact using USEPA's ISCST3 model and one year of meteorological data collected at the Modesto Airport, as described above. The results of the screening procedure are presented in Table 8.1-22. The detailed screening analysis inputs and modeling results are included in Appendix 8.1D. The screening analysis showed that except for annual NO_2 and 24-hour/annual SO_2, impacts under Case 12 (turbine operating at 20 percent load at average ambient temperature) were the highest for each pollutant and averaging period. Case 4 (maximum load, hot ambient temperature) had the highest annual NO_2 and 24-hour/annual SO_2. The stack parameters and emission rates for these operating conditions were used in the refined modeling analyses to evaluate the modeled impacts of the entire Project for each pollutant and averaging period.

The screening analyses included simple, intermediate, and complex terrain. Terrain features were taken from USGS DEM data and 7.5 minute quadrangle maps of the area (30-meter spacing between grid nodes). Cartesian coordinate receptor grids were used to provide adequate spatial coverage surrounding the Project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts (if any), and to identify maximum impact locations. A 250-meter resolution coarse receptor grid was developed that extends outwards 10 km.

TABLE 8.1-22
Results of Screening Procedure: New Gas Turbines Operating Conditions Producing Maximum Modeled Ambient Impacts

Pollutant	Average Period	Gas Turbine Load (percent)	Ambient Temperature (°F)
NOx	1-hour	20%	67
	Annual	100%	102
SO_2	1-hour	20%	67
	3-hour	20%	67
	24-hour	100%	102
	Annual	100%	102
CO	1-hour	20%	67
	8-hour	20%	67
PM_{10}	24-hour	20%	67
	Annual	20%	67

Refined Air Quality Impact Analysis

The operating conditions and emission rates used to model ambient air quality impacts from the Project are summarized in Appendix 8.1D, Table 8.1D-4 for each pollutant and averaging period.

The model receptor grids were derived from 30-meter DEM data. For the refined impact analyses, a nested grid was developed to fully represent the maximum impact area(s). This grid has a 25-meter resolution along the facility fenceline, in three tiers of receptors along the fenceline, out to 75 meters from the fenceline, and 250-meter spacing out to as far as 10 km from the site. When maximum or maximum second-highest impacts occur in the 250 meter spaced area, additional refined receptor grids with 30-meter resolution were placed around the maximum coarse grid impacts and extended out 900 meters in all directions. A map showing the layout of each modeling grid around the site plan is presented in Appendix 8.1A, Figure 8.1-18.

Receptors for the refined modeling analysis were from USGS DEM data for six 7.5-minute quadrangles and included Manteca, Avena, Ripon, Salida, Escalon, and Riverbank.[2] The refined grid contained more than 16,700 receptors at 30-meter resolution.

Specialized Modeling Analyses

Fumigation Modeling. Fumigation occurs when a stable layer of air lies a short distance above the release point of a plume and unstable air lies below. Under these conditions, an exhaust

[2] A figure depicting the area that extends to 10 miles from the project site is included in the Public Health section as Figure 8.6-2. Five copies of the USGS quadrangle maps at a scale of 1:24,000 are being submitted to the CEC under separate cover.

plume may be drawn to the ground, causing high ground-level pollutant concentrations. Although fumigation conditions rarely last as long as one hour, relatively high ground-level concentrations may be reached during that time.

The SCREEN3 model was used to evaluate maximum ground-level concentrations for short-term averaging periods (24 hours or less). Guidance from the USEPA[3] was followed in evaluating fumigation impacts. Because SCREEN3 is a single-source model, each source was modeled separately. Fumigation impacts for the turbines were predicted to occur about 9 km from the facility. This analysis, which is shown in more detail in Appendix 8.1D, showed that impacts under fumigation conditions are expected higher than the maximum concentrations calculated by ISC under downwash conditions.

Turbine Startup. Facility impacts were also modeled during the startup of two turbines to evaluate short-term impacts under startup conditions. Emission rates used for this scenario were based on an engineering analysis of available data provided for a similar facility. A summary of the data evaluated in developing these emission rates was shown in Appendix 8.1D. In accordance with guidance previously provided by the Energy Commission staff, turbine exhaust parameters for the minimum operating load point (20 percent) were used to characterize turbine exhaust during startup and a maximum one-hour NO_x emission rate of 20 lbs/hr was used. Startup impacts were evaluated for the one-hour averaging period using ISCST3. Emission rates and stack parameters used in the startup modeling analysis are shown in Table 8.1-23. Results are summarized in Appendix 8.1D. The startup modeling analysis conservatively assumes that two turbines will be operating in startup mode at the same time.

TABLE 8.1-23
Emission Rates and Stack Parameters Used in Modeling Analysis for Gas Turbine Startup Emissions Impacts

Parameter	Units	Value
Gas turbine stack temperature	Degrees, K	635.4
Gas turbine exhaust velocity	Meters per second	13.00
One-hour average impacts		
NOx emission rate (one gas turbine)	Grams per second	2.52

Turbine Commissioning. A detailed schedule of the commissioning tests expected for the Project is included in Appendix 8.1B. As shown on this schedule, initial tests will be performed prior to the SCR system and oxidation catalyst installation, when the combustor is being tuned. Under this scenario, NO_x emissions would be high because the NO_x emissions control system would not be functioning and because the combustor would not be tuned for optimum performance. CO emissions would also be high because combustor performance would not be optimized and the CO emissions control system would not be functioning. High-emissions will also occur when the combustor had been tuned but the SCR installation was not complete, and other parts of the turbine operating system were being checked out. This is likely to occur under transient conditions, characterized by

3 USEPA-454/R-92-019, "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised."

minimum load operation. Since the combustor would be tuned but the control system installation would not be complete, CO and NO_x levels would again be high.

NOx, CO, VOC, SOx, and PM_{10} emissions during commissioning are presented in Appendix 8.1B. Turbine exhaust parameters for the minimum operating load point (20 percent) were used to characterize turbine exhaust during commissioning. Commissioning impacts were evaluated for the one-hour averaging period using ISCST3. Emission rates and stack parameters used in the commissioning modeling analysis are shown in Appendix D, Table 8.1D-5. The commissioning modeling analysis conservatively assumes that two turbines will be operating with uncontrolled emissions at the same time during the commissioning period.

Ambient Ratio Method. Annual NO_2 concentrations were calculated using the Ambient Ratio Method (ARM), adopted in Supplement C to the Guideline on Air Quality Models (USEPA, 1994). The Guideline allows a nationwide default conversion rate of 75 percent for annual NO_2/NOx ratios.

Results of the Ambient Air Quality Modeling Analyses

The maximum facility impacts calculated from each of the modeling analyses described above are summarized in Table 8.1-24 below. The highest 1-hour average CO impacts are expected during turbine commissioning. The results of the fumigation modeling analysis are summarized in Appendix 8.1D.

TABLE 8.1-24
Summary of Results From Refined Modeling Analyses

		Modeled Concentration (µg/m3)			
Pollutant	Averaging Time	ISCST3 (Turbines, Dryer and Cooling Towers)	Fumigation	Startup	Commissioning
NO_2	1-hour	1.73	1.95	24.35	44.11
	Annual	0.02[a]	n/a[b]	n/a	n/a
SO_2	1-hour	0.19	0.22	n/a	n/a
	3-hour	0.06	0.11	n/a	n/a
	24-hour	0.01	n/a[b]	n/a	n/a
	Annual	0.00	n/a[b]	n/a	n/a
CO	1-hour	2.53	2.85	n/a	48.35
	8-hour	0.43	1.01	n/a	8.11
PM_{10}	24-hour	~~0.45~~0.52	n/a[b]	n/a	n/a
	Annual	~~0.10~~0.13	n/a[b]	n/a	n/a

[a] Modeled annual NOx corrected to NO_2 using ARM default value of 0.75.
[b] Fumigation is a short-term phenomenon and does not affect averaging periods as long as 24 hours.

Ambient Air Quality Impacts

To determine a project's air quality impacts, the modeled concentrations are added to the maximum background ambient air concentrations and then compared to the applicable ambient air quality standards. The modeled concentrations have already been presented in earlier tables. The maximum background ambient concentrations are listed in the following text and tables. A detailed discussion of why the data collected at these stations are representative of ambient concentrations in the vicinity of the Project was provided above.

Table 8.1-25 presents the maximum concentrations of NO_x, CO, PM_{10}, and SO_2, recorded for 1998 through 2001 at the Modesto and Bethel Island stations, respectively. Maximum ground-level impacts due to operation of the Project are shown together with the ambient air quality standards in Table 8.1-26. Using the conservative assumptions described earlier, the results indicate that the Project will not cause or contribute to violations of any state or federal air quality standards, with the exception of the state PM_{10} standard and state and federal $PM_{2.5}$ standards. For these pollutants, existing concentrations already exceed the standard.

TABLE 8.1-25
Maximum Background Concentrations, 1998-2001 (µg/m3)

Pollutant	Averaging Time	1998	1999	2000	2001
Modesto 14th Street					
NO_2	1-hour Annual	165 37.6	194 41.4	149 35.7	164 33.8
CO	1-hour 8-hour	10,756 8,353	13,045 7,323	9,154 6,866	8,925 6,866
PM_{10}	24-hour Annual[a]	125 29	132 41	112 34	158 35
$PM_{2.5}$	24-hour Annual[a]	- -	108 24.9	77 18.7	95 15.6
Bethel Island					
SO_2	1-hour 3-hour 24-hour Annual	73.4 52.4 23.6 5.2	76.0 36.7 21.0 2.6	47.2 39.3 21.0 5.2	39.3 28.8 21.0 5.2

[a] Annual arithmetic mean

TABLE 8.1-26
Modeled Maximum Project Impacts

Pollutant	Averaging Time	Maximum Facility Impact (µg/m3)	Background (µg/m3)	Total Impact (µg/m3)	State Standard (µg/m3)	Federal Standard (µg/m3)
NO_2	1-hour Annual	44.1 0.02	194 41.4	238 41	470 -	- 100
SO_2	1-hour 3-hour 24-hour Annual	0.22 0.11 0.01 0.00	76.0 52.4 23.6 5.2	76 53 24 5	650 - 109 -	- 1300 365 80
CO	1-hour 8-hour	48.4 8.1	13,045 8,353	13,093 8,361	23,000 10,000	40,000 10,000
PM_{10}	24-hour Annual[a]	~~0.45~~0.52 ~~0.10~~0.13	158 41	159 41	50 20	150 50

$PM_{2.5}$	24-hour Annual[a]	~~0.45~~0.52 ~~0.10~~0.13	108 24.9	109 25.0	- 12	65 15

[a] Annual arithmetic mean

PSD Increment Consumption

The Prevention of Significant Deterioration (PSD) program was established to allow emission increases (increments of consumption) that do not result in significant deterioration of ambient air quality in areas where criteria pollutants have not exceeded the National Ambient Air Quality Standards (NAAQS). For the purposes of determining applicability of the PSD program requirements, the following regulatory procedure is used.

- Project emissions are evaluated to determine whether the potential increase in emissions will be significant.
- Because the MEGS facility is a new stationary source, the increase in emissions from MEGS must be major in order to trigger PSD.
- The emissions increases from the MEGS are those that will result from the proposed new equipment.
- For facilities comprised of simple cycle gas turbines, USEPA considers a potential increase of 250 tons per year of any of the criteria pollutants to be major.
- In this specific case, MEGS is not considered a new major source because it does not result in an increase in emissions of any single pollutant exceeding 250 tons per year.

Table 8.1-27 compares the potential emissions increases with the major source threshold.

TABLE 8.1-27
Comparison of Emissions Increase with PSD Significant Emissions Levels

Pollutant	Project Emissions (tons per year)	PSD Major Source Threshold (tons per year)	Significant?
PM_{10}	26.~~5~~7	250	No
VOC	11.1	250	No
NO_x	45.3	250	No
SO_2	4.4	250	No
CO	58.0	250	No

Table 8.1-27 shows that the Project will not result in an increase in emissions exceeding the major source threshold for PM_{10}, VOC, SO_2, NO_x, or CO. Therefore, PSD review is not required for the entire facility.

PSD Class I Impact

PSD regulations limit the degradation of air quality in areas designated Class I by imposing more stringent limits on air quality impacts from new sources and modifications. As discussed above, the Project does not trigger PSD review for any pollutant. Therefore, a Class

I impact analysis is not required for the Project. However, for purposes of full disclosure, an impact analysis was performed for Class I areas located within 100 km of the Project site. The following are the areas designated Class I by EPA within 100 km of the Project:

- Yosemite National Park
- Emigrant Wilderness Area

For each Class I area, receptors were placed along the boundary of the area nearest the Project to evaluate the maximum modeled impacts of the Project on the area.

The results of the modeling analysis are compared with the Class I increments in Table 8.1-28. These results show that the modeled impacts of the Project in the nearby Class I areas are far below the PSD Class I increments and will not significantly degrade air quality.

TABLE 8.1-28
Project Impacts in Class I Area

Pollutant	Averaging Period	Maximum Impact in Class I Area (µg/m^3)	PSD Class I Increment (µg/m^3)
Yosemite National Park			
NO_2	Annual	0.00	2.5
SO_2	Annual	0.00	2
	24 hours	0.00	5
	3 hours	0.00	25
PM_{10}	Annual	0.00	5
	24 hours	0.00	10
Emigrant Wilderness Area			
NO_2	Annual	0.00	2.5
SO_2	Annual	0.00	2
	24 hours	0.00	5
	3 hours	0.00	25
PM_{10}	Annual	0.00	5
	24 hours	0.00	10

8.1.5.2 Screening Health Risk Assessment

The screening health risk assessment (SHRA) was conducted to determine expected impacts on public health of the noncriteria pollutant emissions from the facility. The SHRA was conducted in accordance with the CAPCOA *Air Toxics "Hot Spots" Program Revised 1992, Risk Assessment Guidelines* (October 1993) and the SJVUAPCD "Risk Management Policy for Permitting New and Modified Sources" (March 2001). The SHRA estimated the offsite cancer risk to the maximally exposed individual (MEI), as well as indicated any adverse effects of noncarcinogenic compound emissions. The CARB/OEHHA Health Risk Assessment computer program was used to evaluate multipathway exposure to toxic substances. Because of the conservatism (overprediction) built into the established risk analysis methodology, the actual risks will be lower than those estimated.

A health risk assessment requires the following information:

- Unit risk factors (or carcinogenic potency values) for any carcinogenic substances that may be emitted
- Noncancer reference exposure levels (RELs) for determining noncarcinogenic health impacts
- One-hour and annual average emission rates for each substance of concern
- The modeled maximum offsite concentration of each of the pollutants emitted.

Pollutant-specific unit risk factors are the estimated probability of a person contracting cancer as a result of constant exposure to an ambient concentration of 1 µg/m^3 over a 70-year lifetime. The SHRA uses unit risk factors specified by the California Office of Environmental Health Hazard Assessment (OEHHA). The cancer risk for each pollutant emitted is the product of the unit risk factor and the modeled concentration. All of the pollutant cancer risks are assumed to be additive.

An evaluation of the potential noncancer health effects from long-term (chronic) and short-term (acute) exposures has also been included in the SHRA. Many of the carcinogenic compounds are also associated with noncancer health effects and are therefore included in the determination of both cancer and noncancer effects. RELs are used as indicators of potential adverse health effects. RELs are generally based on the most sensitive adverse health effect reported and are designed to protect the most sensitive individuals. However, exceeding the REL does not automatically indicate a health impact. The OEHHA reference exposure levels were used to determine any adverse health effects from noncarcinogenic compounds. A hazard index for each noncancer pollutant is then determined by the ratio of the pollutant annual average concentration to its respective REL for a chronic evaluation. The individual indices are summed to determine the overall hazard index for the Project. Because noncancer compounds do not target the same system or organ, this sum is considered conservative. The same procedure is used for the acute evaluation.

CARB's HRA model was used to determine maximum toxics impacts from each Project source (two turbines combined and the cooling towers). The modeled maximum hourly and annual average impacts for the entire facility were input to the model, and the facility-wide toxic emission rates were also input. The facility-wide carcinogenic risk, acute inhalation, chronic inhalation, and chronic noninhalation impacts are shown in Table 8.1-29. Appendix 8.1E includes the HRA program printouts. Details of the calculations of toxic emission rates used for modeling are also shown in Appendix 8.1B.

SHRA results for the Project are compared with the established risk management procedures for the determination of acceptability. The established risk management criteria include those listed below.

- If the potential increased cancer risk is less than one in a million, the facility risk is considered "de minimis"—that is, not significant.
- If the potential increased cancer risk is greater than one in a million, but less than ten in a million, and Toxic Best Available Control Technology (T-BACT) has been applied to reduce risks, the facility risk is considered acceptable.

- If the potential increased cancer risk is greater than ten in a million and there are mitigating circumstances that, in the judgment of a regulatory agency, outweigh the risk, the risk is considered acceptable.
- For noncancer effects, total hazard indices of one or less are considered "de minimis" (not significant).
- For a hazard index greater than 1.0, T-BACT must be used and the SJVUAPCD must conduct a more refined review of the analysis and determine whether the impact is acceptable.

The SHRA includes the noncriteria pollutants listed above in Table 8.1-21. The receptor grid described earlier for criteria pollutant modeling was used for the SHRA. The nearest sensitive receptor is a church located 0.4 miles from the Project site. Sensitive receptors within a 3-mile radius of the Project site are shown on Appendix 8.1A, Figure 8.1-19. Further description of sensitive receptors within a 3-mile radius of the Project site is presented in the hazardous materials section, Section 8.12.

The SHRA results for the proposed Project are presented in Table 8.1-29, and the detailed HRA modeling results are provided in Appendix 8.1E. The locations of the maximum modeled risks are shown in Appendix 8.1A, Figure 8.1-19.

TABLE 8.1-29
Screening Health Risk Assessment Results

Type of Risk	Maximum Modeled Risk
Cancer risk to maximally exposed individual	~~0.08~~0.22 in one million
Cancer risk to maximally exposed residential receptor	0.003~~1~~ in one million
Cancer risk to maximally exposed workplace receptor	0.0007~~2~~ in one million
Cancer risk to maximally exposed sensitive receptor	0.02 in one million
Acute inhalation hazard index	~~0.035~~0.02
Chronic inhalation hazard index	~~0.003~~0.002
Chronic noninhalation exposure	Max. dose/REL = 1.96~~1.08~~x10^{-5}

The screening HRA results indicate that the acute and chronic hazard indices are well below the significance level of 1.0. In addition, the maximum chronic noninhalation exposure is well below the REL so is also considered insignificant. The cancer risk associated to a maximally exposed individual is also below the significance level of 1 in a million.

The screening HRA results indicate that, overall, the Project will not pose an unacceptable health risk at any location.

8.1.5.3 Construction Impacts Analysis

Emissions caused by the construction phase of the Project have been estimated, including an assessment of emissions from vehicle and equipment exhaust and the fugitive dust generated from material handling. A dispersion modeling analysis was conducted based on these emissions. A detailed analysis of the emissions and ambient impacts is included in Appendix 8.1F. The results of the analysis indicate that the maximum construction impacts will be below the state and federal standards for all the criteria pollutants emitted. The best available emission control techniques will be used. The construction site impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards.

Combustion diesel PM_{10} emission impacts have also been evaluated to demonstrate that the carcinogenic risk from construction activities will be below ten in one million. This risk screening analysis is also included in Appendix 8.1F.

8.1.6 Consistency with Laws, Ordinances, Regulations, and Standards

8.1.6.1 Consistency with Federal Requirements

The SJVUAPCD has been delegated authority by the USEPA to implement and enforce most federal requirements that are applicable to the Project, including the new source performance standards. However, the SJVUAPCD has not been delegated authority for PSD review. Compliance with the SJVUAPCD regulations ensures compliance and consistency with the corresponding federal requirements. A separate PSD application to USEPA is not required because the Project does not result in an increase of any single pollutant greater than 250 tons per year.

The Project will also be required to comply with the Federal acid rain requirements (Title IV). Because the SJVUAPCD has received delegation for implementing Title IV through its Title V permit program, MEGS will secure a SJVUAPCD Title V permit that imposes the necessary requirements for compliance with the Title IV acid rain provisions.

As discussed in SPPE Section 8.1.5, Laws, Ordinances, Regulations and Standards, the federal PSD program requirements apply on a pollutant-specific basis to the following:

- A new major facility that will emit 100 tpy or more, if it is one of the 28 PSD source categories in the federal Clean Air Act, or a new facility that will emit 250 tpy or more;
- A major modification to an existing major facility that will result in net emissions increases in excess of significant emissions levels; or
- A modification to an existing minor source when that modification is major by itself.

The proposed Project is a new stationary source and is not major. The emissions levels summarized in Table 8.1-27 showed that the Project is not subject to PSD review, because no emissions exceed the 250 tpy significance threshold.

8.1.6.2 Consistency with State Requirements

State law provides local air pollution control districts and air quality management districts with the principal responsibility for regulating emissions from stationary sources. As discussed above, the Project is under the local jurisdiction of the SJVUAPCD, and compliance with SJVUAPCD regulations will ensure compliance with state air quality requirements.

8.1.6.3 Consistency with Local Requirements: San Joaquin Valley Unified Air Pollution Control District

The SJVUAPCD has been delegated responsibility for implementing local, state, and federal air quality regulations in the eight counties[4] within the SJVUAPCD. The Project is subject to SJVUAPCD regulations that apply to new and modified sources of emissions, to the prohibitory regulations that specify emission standards for individual equipment categories, and to the requirements for evaluation of impacts from toxic air pollutants. The following sections include the evaluation of facility compliance with the applicable SJVUAPCD requirements.

Under the regulations that govern new sources of emissions, MEGS is required to secure a preconstruction Determination of Compliance from the SJVUAPCD (Rule 2201), as well as demonstrate continued compliance with regulatory limits when the Project becomes operational. The preconstruction review includes demonstrating that the Project will use best available control technology (BACT) and will provide any necessary emission offsets.

Applicable BACT levels are shown in Table 8.1-30, along with anticipated potential facility emissions. SJVUAPCD Rule 2201 requires the Project to apply BACT for emissions of NO_x, VOC, SOx, and PM_{10} (criteria pollutants) in excess of 2.0 pounds per emissions unit per highest day. Rule 2201 also imposes BACT for emissions of CO, lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds when emitted in excess of specified amounts. With the exception of CO, the Project will not emit any of these latter pollutants in detectable quantities; therefore, these latter BACT requirements are not applicable. For CO, since the Project has a potential to emit less than 200,000 pounds per year the Project is exempt from the BACT requirements for CO. As shown in the table, BACT is required for NO_x, VOC, SO_x, and PM_{10}. While BACT is not trigger for CO, as discussed below the Project will be equipped with an oxidation catalyst system that meets BACT requirements. The calculation of facility emissions was discussed in SPPE Section 8.1.5.1.1.

TABLE 8.1-30
Best Available Control Technology Requirements

Pollutant	Applicability Level	Emission Rate Per Turbine	Emission Rate Per Cooling Tower	Emission Rate for Spray Dryer	BACT Required?
Criteria Pollutants: SJVUAPCD Regulation 2201					
VOC	2 lbs/day	30 lbs/day	0	0	Turbines
NO_x	2 lbs/day	155 lbs/day	0	0	Turbines
SO_x	2 lbs/day	12 lbs/day	0	0	Turbines
PM_{10}	2 lbs/day	72 lbs/day	0.6 lbs/day	1.2 lbs/day	Turbines
CO	2 lbs/day	159 lbs/day	0	0	No[a]
Noncriteria Pollutants: SJVUAPCD Regulation 2201					
Lead	3.2 lbs/day	neg.	neg.	neg.	No

[4] Including the portion of Kern County that is within the District boundaries.

Asbestos	0.04 lbs/day	neg.	neg.	neg.	No
Beryllium	0.0022 lbs/day	neg.	neg.	neg.	No
Mercury	0.55 lbs/day	neg.	neg.	neg.	No
Fluorides	16.44 lbs/day	neg.	neg.	neg.	No
Sulfuric acid mist	38.35 lbs/day	neg.	neg.	neg.	No
Hydrogen sulfide, total reduced sulfur or reduced sulfur compounds	54.79 lbs/day	neg.	neg.	neg.	No

[a] With maximum facility CO emission less than 200,000 pounds per year, the Project is exempt from BACT requirements for CO.

BACT for the applicable pollutants was determined by reviewing the SJVUAPCD BACT Guidelines Manual, the South Coast Air Quality Management District BACT Guidelines Manual, the most recent Compilation of California BACT Determinations, CAPCOA (2nd Ed., November 1993), and USEPA's BACT/LAER Clearinghouse. A summary of the review is provided in Appendix 8.1G. For the gas turbines, the SJVUAPCD considers BACT to be the most stringent level of demonstrated emission control that is feasible. The Project will use the BACT measures discussed below.

As a BACT measure, the Applicant will limit the fuels burned at the Project turbines to natural gas, a clean burning fuel. Liquid fuels will not be fired at MEGS. Burning of liquid fuels in the gas turbine combustors would result in greater criteria pollutant emissions than if the units burned only gaseous fuels. This measure acts to minimize the formation of all criteria air pollutants.

BACT for NO_x emissions from the gas turbines will be the use of use water injection and add-on controls. The turbines will be equipped with a selective catalytic reduction (SCR) system to reduce NO_x emissions to 2.5 ppmvd NO_x, corrected to 15 percent O_2 on a one-hour average basis. The SJVUAPCD BACT guidelines indicate that BACT for gas turbines less than 50 MW without heat recovery is an exhaust concentration not to exceed 3.0 ppmvd NO_x @ 15 percent O_2; therefore, the Project will surpass the SJVUAPCD's BACT requirements for NO_x. The SJVUAPCD BACT Guideline determination for NO_x from gas turbines is shown in Appendix 8.1G.

BACT for CO emissions will be achieved by use of gas turbines equipped with an oxidation catalyst system. The oxidation catalyst system will reduce CO emissions to 6.0 ppmvd NO_x, corrected to 15 percent O_2. The SJVUAPCD BACT guidelines indicate that BACT for gas turbines less than 50 MW without heat recovery is 6 ppmvd CO, corrected to 15 percent O_2. Consequently, the CO emissions from the gas turbines will meet the SJVUAPCD's BACT requirements. A review of recent BACT determinations for CO from gas turbines is provided in Appendix 8.1G.

BACT for VOC emissions will be achieved by use of good combustion practices. BACT for VOC emissions from combustion devices has historically been the use of best combustion practices. With the use of the gas turbine combustors proposed for this Project, VOC emissions leaving the stacks will not exceed 2.0 ppmvd, corrected to 15 percent O_2. This level of emissions is consistent with the SJVUAPCD's BACT guidelines for gas turbines less than 50 MW without heat recovery. A review of recent BACT determinations for VOC from gas turbines is provided in Appendix 8.1G.

For the turbines, BACT for PM_{10} is use of good combustion practices and the use of gaseous fuels. As mentioned, use of clean burning natural gas fuel will result in minimal particulate emissions. A review of recent BACT determinations for PM_{10} from gas turbines is provided in Appendix 8.1G.

SOx emissions will be kept at a minimum by firing clean burning natural gas fuel. A review of recent BACT determinations for SOx from gas turbines is provided in Appendix 8.1G.

In addition to the BACT requirements, SJVUAPCD Rule 2201 requires the Applicant to provide full emission offsets when emissions exceed specified levels on a pollutant-specific basis. Offsets for CO are not required if the Applicant demonstrates to the satisfaction of the APCO that the ambient air quality standards for CO are not currently being violated and that the Project will not cause or contribute to a violation of the standards. This showing was made in Section 8.1.5.1 (Table 8.1-26). As shown in Table 8.1-31, the Project will be required to provide emission offsets for NO_x, PM_{10}, and VOC emissions.

TABLE 8.1-31 (REVISED 6/11/03)
SJVUAPCD Offset Requirements and MEGS Emissions

Pollutant	Offset Threshold	MEGS Emission Rate	Offsets Required?
VOC	20,000 lb/yr	22,200 lbs/yr	Yes
NO_x	20,000 lb/yr	88,990 lbs/yr[a]	Yes
PM_{10}	29,200 lb/yr	~~52,600~~53,000 lbs/yr[b]	Yes
SO_2	54,750 lb/yr	8,800 lbs/yr	No

[a] NOx emissions reflect reasonable worst-case operation and are less than values used for modeled worst-case impacts. See Appendix 8.1B.
[b] Excluding emissions from cooling towers that are exempt from permitting.

The SJVUAPCD's NSR rule requires emission reductions to be provided at an offset ratio of between 1 and 1.5 to 1, depending upon the distance between the source and the offset location. Interpollutant offsets are permitted, at the discretion of the APCO. Additionally, Rule 2201.4.7.2.1 only requires that offsets be provided for emissions increases in excess of the offset trigger level. Therefore, only increases in NOx, PM_{10}, and VOC emissions above the offset trigger level must be offset.

The NSR rule also requires Project denial if air quality modeling results indicate emissions will cause or exacerbate the violation of the applicable ambient air quality standards, after accounting for mitigation. The modeling analyses in Section 8.1.5.1 show that with the exception of PM_{10}, facility emissions will not interfere with the attainment or maintenance of the applicable air quality standards. Because the SJVUAPCD is currently a nonattainment area for PM_{10}, any increase in PM_{10} emissions has the potential to exacerbate existing violations. However, the Applicant will be providing PM_{10} offsets to mitigate the impact of the emissions increase; as a result, the required finding can be made for PM_{10} as well.

Emissions offset requirements for NO_x, VOC, and PM_{10} are shown in Table 8.1-32. The Applicant has secured all NOx, VOC, and PM_{10} offsets necessary for this project. The Applicant will utilize an interpollutant trade of SO_2 for PM_{10} offsets in accordance with SJVUAPCD Rule 2201, Section 4.13.3.2. ~~A small amount of VOC offsets are still required, and will either be purchased or satisfied by converting excess NOx offsets currently owned by the Applicant to VOC offsets in accordance with Rule 2201, Section 4.13.3.4. The Applicant will work with emission credit brokers from Cantor Fitzgerald, Emission Credit Brokers, and TFS Environmental Services to acquire the remaining VOC offsets, if it decides to purchase these offsets.~~ A detailed listing of the offsets owned by the Applicant is included in Appendix 8.1-B, along with copies of MID's and the previous owner's emission reduction credit certificates (Applicant has not yet received ~~the~~ all revised certificates in its name from the SJVUAPCD).

TABLE 8.1-32 (REVISED 6/11/03)
Facility Offset Requirements[a]

Pollutant	Facility Emissions[b] (lbs/quarter)	Offset Ratios	Offsets Required (lbs/quarter)	Offsets Owned and Propsoed to be Surrendered by Applicant (lbs/quarter)
NO_x	17,248[c]	1.5:1	25,871	25,871~~950~~ (Cert. #N-372~~60~~-2, N-371~~142~~-2, C-538~~456~~-2)
VOC	534	1.5:1	801	~~6595~~5,534 (Cert. #C-~~456~~539-1, C-455-1, C-432-1, C-438-1, S-1844-1, N-130-1)
PM_{10}	~~5,840~~5,950	2.5:1 ~~(~~SO_2:PM_{10} interpollutant ratio~~)~~[d] 1.5:1 SO_2:PM_{10} interpollutant ratio	~~14,600~~14,874 8,924	~~15,420~~ 15,555 (Cert. #N-~~224~~374-5, C-~~27~~531-5, S-1955-5)

a) Offsets must be provided on a quarterly basis. See Appendix 8.1B.
b) Facility emissions above the offset trigger level.
c) NOx emissions reflect reasonable worst-case operation and are less than values used for modeled worst-case impacts. See Appendix 8.1B.
d) Assumes worst-case 2.5:1 interpollutant ratio, including distance factor; Applicant has proposed and provided justification for a ratio of 1.5:1, including distance factor.

Rule 2520, Federal Part 70 Permits (Title V permit program) applies to facilities that emit more than 25 tons per year of NOx or VOC. The Phase II acid rain requirements of Rule 2540 are also applicable to the facility. As a Phase II acid rain facility, MEGS will be required to provide sufficient allowances for every ton of SO_2 emitted during a calendar year. The Applicant will file the appropriate applications for Title V and acid rain permits, and will obtain any necessary allowances on the current open trade market. The power plant is also required to install and operate continuous monitoring systems on the new units.

The general prohibitory rules of the SJVUAPCD applicable to the Project and the determination of compliance follow.

- **Rule 4001 (New Source Performance Standards).** Subpart GG of this rule requires monitoring of fuel; imposes limits on the emissions of NOx and SO_2; and requires source testing of stack emissions, process monitoring, and data collection and recordkeeping. All of the BACT limits imposed on the facility will be more stringent than the NSPS emission limits. Monitoring and recordkeeping requirements for BACT will be more stringent than the requirements in this rule; therefore, the facility will comply with the NSPS regulations.
- **Rule 4101 (Visible Emissions).** Any visible emissions from the facility will not be darker than No. 2 when compared to a Ringlemann Chart for any period(s) aggregating 3 minutes in any hour. Because the facility will burn clean fuels, the opacity standard of not greater than 20 percent for a period or periods aggregating 3 minutes in any hour and the particulate emission concentrations limit of 0.15 grains per standard cubic feet of exhaust gas volume will not be exceeded.
- **Rule 4102 (Public Nuisance).** The facility will emit insignificant quantities of odorous or visible substances; therefore, the facility will comply with this regulation.
- **Rule 4201 (Particulate Matter Emission Standards).** The emission units will have particulate matter emission rates well below the limits of the rule. The maximum grain loading for the turbines (from Appendix 8.1B) is 0.0026 gr/dscf, well below the 0.1 gr/dscf limit of the rule.
- **Rule 4703 (Stationary Gas Turbines).** Emissions from the new turbine will be well below the limits in this rule.
- **Rule 4801 (Sulfur Compound Emissions).** Because the Project will use only natural gas fuel, all of the Rule 4801 limits will easily be complied with.
- **Rule 7012 (Hexavalent Chromium—Cooling Towers).** The proposed cooling towers will not use hexavalent chromium.
- **Rule 8010 (Fugitive Dust Administrative Requirements for Control of PM_{10}).** This rule includes definitions, exemptions, requirements and fees related to the control of PM_{10}.
- **Rule 8020 (Fugitive Dust Requirements for Control of PM_{10} from Construction, Demolition, Excavation and Extraction Activities).** This rule requires the use of reasonably available control measures (RACM) to control fugitive dust emissions during construction activities. The Applicant has committed to implementing RACM by using dust control measures during construction to minimize fugitive dust emissions.

8.1.6.4 Environmental Checklist

The following checklist questions are used by the CEC to assess the significance of potential air quality impacts.

	Potentially Significant Impact	Less than Significant w/Mitigation	Less than Significant	No Impact
AIR QUALITY -- Would the project:				
a. Conflict with or obstruct implementation of the			X	

	Potentially Significant Impact	Less than Significant w/Mitigation	Less than Significant	No Impact
applicable air quality plan?				
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?		X		
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?		X		
d. Expose sensitive receptors to substantial pollutant concentrations?		X		
e. Create objectionable odors affecting a substantial number of people?			X	

8.1.7 Cumulative Air Quality Impacts Analysis

An analysis of potential cumulative air quality impacts that may result from the Project and other reasonably foreseeable projects is generally required only when Project impacts are significant.

To ensure that potential cumulative impacts of the Project and other nearby projects are adequately considered, a cumulative impacts analysis will be conducted in accordance with the protocol included as Appendix 8.1H.

8.1.8 Mitigation

Mitigation will be provided for all emissions increases from the Project in the form of offsets and the installation of BACT, as required under SJVUAPCD regulations. Because we expect the cumulative air quality impacts analysis described in Appendix 8.1H to show that the Project will not result in significant cumulative impacts, the Applicant believes that no additional mitigation is necessary beyond the offsets that will be provided in accordance with SJVUAPCD requirements.

The Applicant notes that offsets provided in accordance with SJVUAPCD requirements do not mitigate emissions from the MEGS facility on a one-to-one basis. However, the Applicant has purchased additional VOC offsets in order to mitigate the project on a one to one basis. ~~when the MEGS offsets are combined with the surplus offsets from the MID Woodland Generation Station 2 (WGS2) project (CEC Docket 01-SPPE1), then emissions are fully mitigated on a 1 to 1 basis. Combining the mitigation from MEGS and WGS2 is analogous to the multi-project mitigation approach accepted by the CEC in the case of the Carson Ice Gen, Sacramento Power Authority, and Sacramento Cogeneration Authority projects developed by SMUD in the early 1990s. This approach is appropriate for WGS2 and the MEGS projects because: (1) the two projects are owned and operated by the same municipal utility; (2) the two projects are located in the same air basin; (3) the two projects are located in the same air district; (4) the two projects are located within 8 miles of each other; and (5) the project with surplus credits~~

~~(WGS2) was licensed first, constructed first, and will operate first.~~ Table 8.1-33 summarizes project emissions and offsets (mitigation) required or provided for the MEGS ~~and WGS2~~ project~~s~~.

TABLE 8.1-33 (REVISED 6/11/03)
Project Emissions and Annual Mitigation—MEGS ~~and WGS2~~ Project~~s~~

	NOx (TPY)	VOC (TPY)	PM_{10} (TPY)	SO_2 (TPY)
~~WGS2 emissions~~	~~-29.17~~	~~-7.85~~	~~-13.86~~	~~-2.14~~
~~WGS2 mitigation~~	~~+35.15~~	~~+9.48~~	~~0.00~~	~~+55.02~~
~~WGS2 net emissions~~	~~+5.98~~	~~+1.63~~	~~-13.86~~	~~+52.88~~
MEGS emissions (including cooling towers and spray dryer)	-~~42.02~~44.50	-11.07	-~~26.51~~26.73	-4.38
MEGS mitigation	+51.90~~48.02~~	+~~1.60~~11.22	0.00	+~~29.20~~31.84
MEGS net emissions	+~~6.01~~7.40	~~-9.47~~+0.15	~~-26.51~~ -26.73	+~~24.82~~27.46
~~Combined net emissions~~	~~+11.99~~	~~-7.83~~	~~-40.37~~	~~+77.70~~
~~Combined net emissions— PM_{10} offset with SO_2 at 2:1; VOC offset with NOx at 1:1; and SO_2 offset with NOx at 1:1~~	~~+1.12~~	~~0.00~~	~~0.00~~	~~0.00~~

Table 8.1-33 indicates that emissions from the MEGS Project are fully mitigated on a one to one, annual basis. ~~when combined with the emissions and mitigation from the WGS2 project. This conclusion assumes that excess NOx mitigation is applied to VOC and SO_2 emissions at a 1:1 ratio, and that excess SO_2 mitigation is applied to PM_{10} emissions at 2:1 ratio.~~

8.1.9 References

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